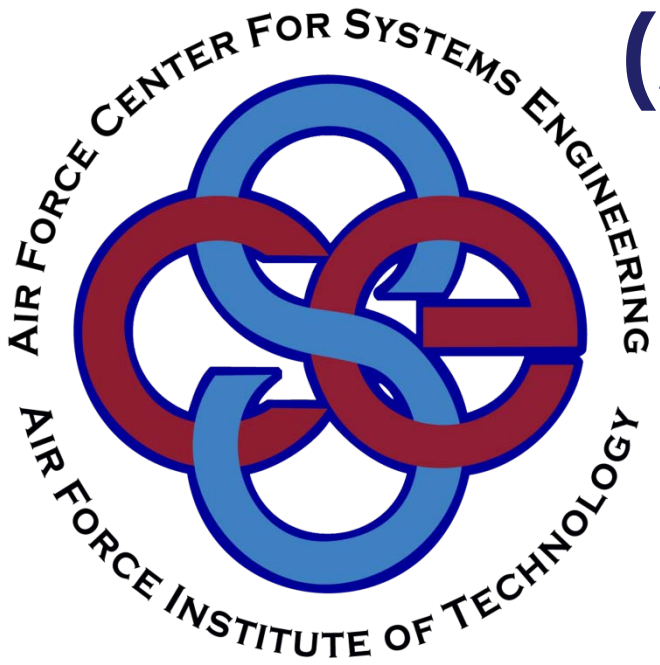
AF Systems Engineering Assessment Model (AF SEAM)



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Applications & Development Division
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20 Oct 08

Report Documentation Page

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Why AF SEAM

Problem:

- AF programs late, over cost, & do not provide the performance expected
- SECAF directed action to revitalize SE across the AF
- No standard tool/method for assessing SE processes

Goals:

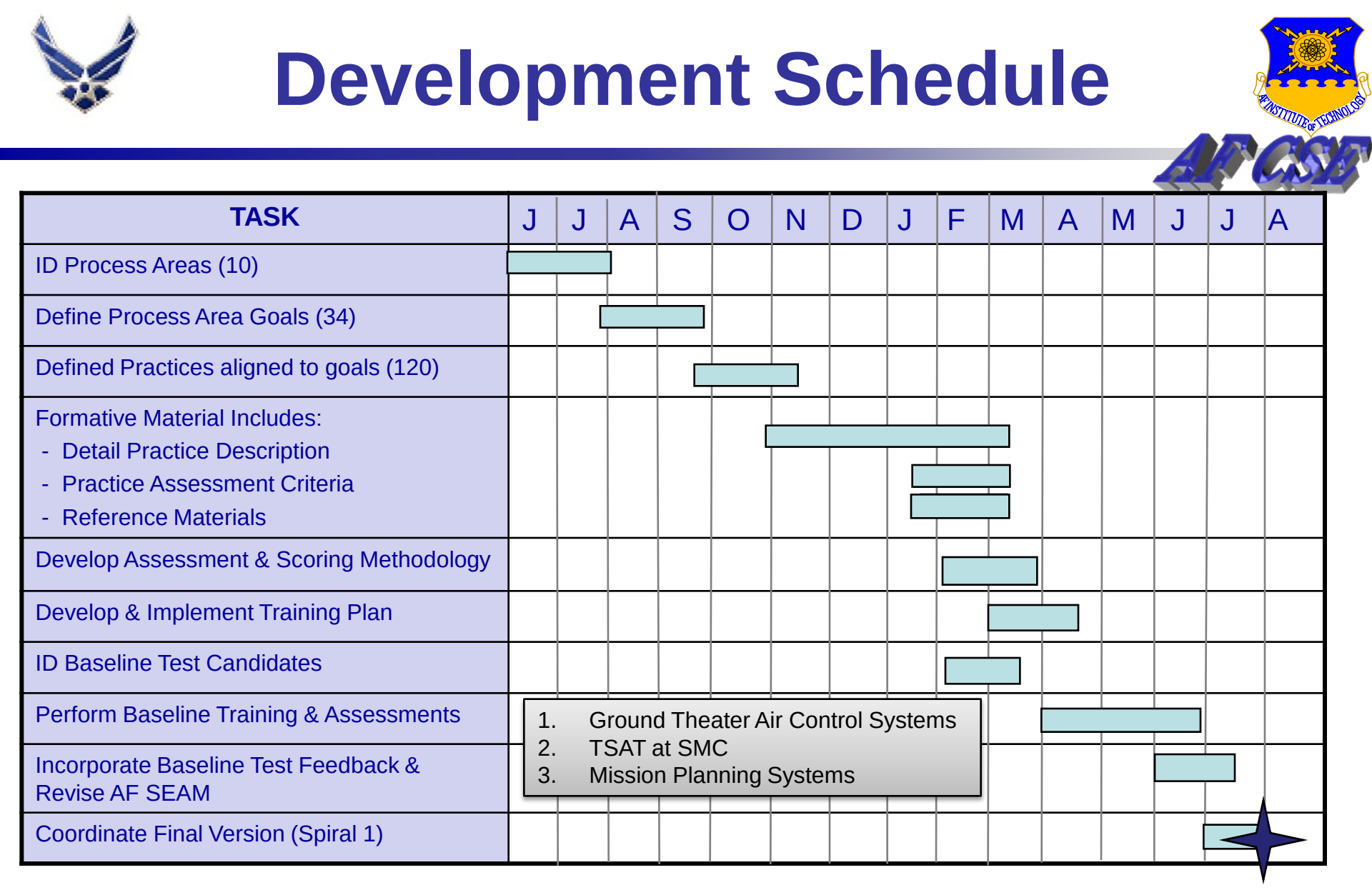
- Promote consistent understanding of SE
- Ensure core SE processes are in place and being practiced
- Facilitate sharing “Best Practices”
- Provide “Brain Drain” insurance
- Improve AF leadership visibility into SE process maturity

Improved program performance & reduced technical risk

Background

- Original task: AFMC EC Action Item
  - Objective: “Develop standard AF assessment model”
  - Tools were in place @ 4 Centers
- 12 On-Site Team Engagements
  - Representatives from EN Home Offices
    - 4 Product Centers, 3 ALCs, AEDC, HQ AFMC/EN, CSE
  - Met 9 times at 5 different locations in one year
  - Conducted 3 baseline assessments at 3 Centers
- 12 Briefings to Senior Leaders
  - AFMC Engineering Council Meetings (4)
  - ALC EN Meeting
  - SAF/AQR (2)
  - AF Tech Leaders Round Table
  - OSD (AT&L) & Boeing SE Advisory Group
  - National Research Council (National Academies)
  - Final to AFMC/EN – 5 Aug 08, & Final to SAFF/AQR – 11 Aug 08

Development Schedule



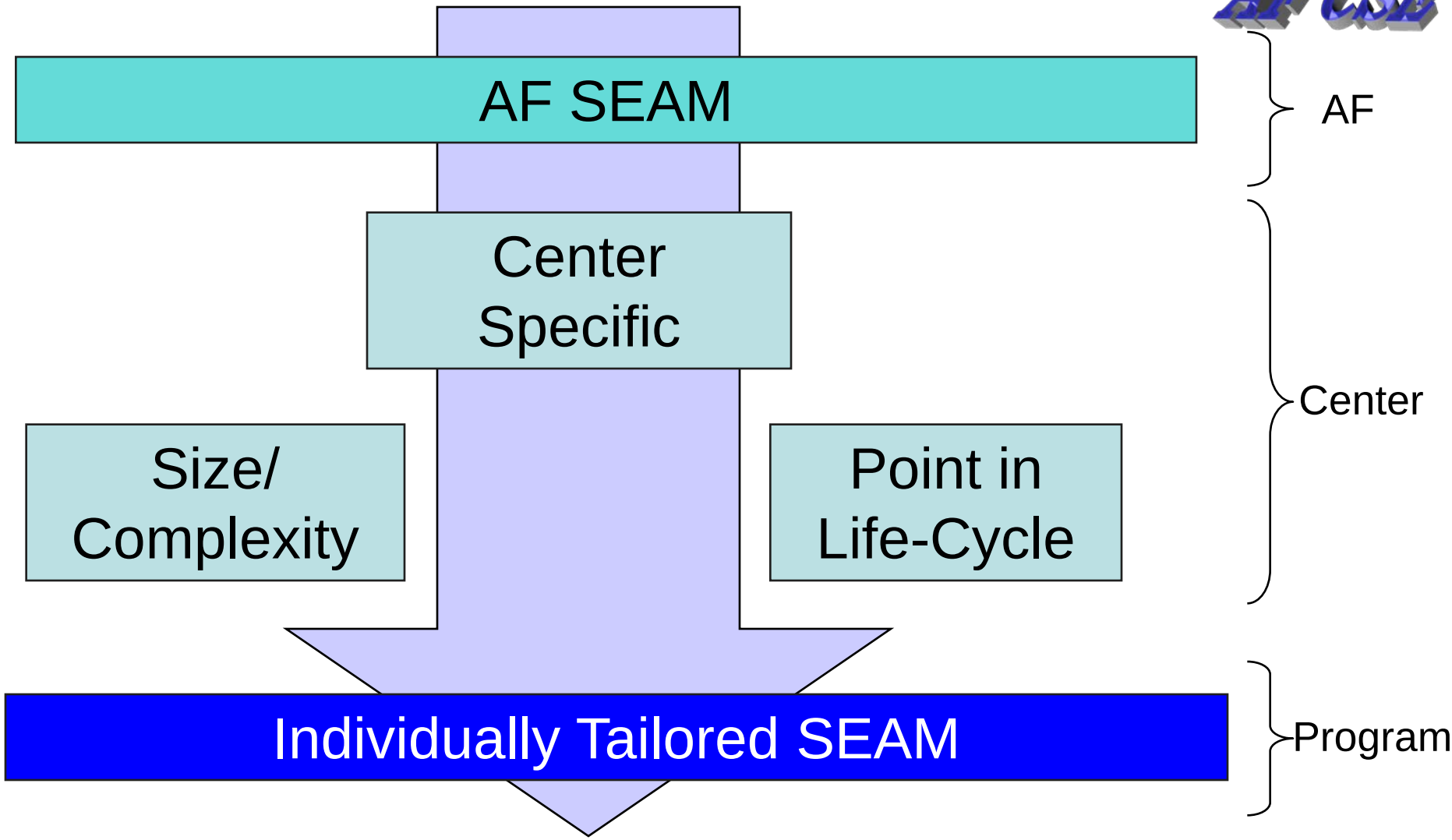
DELIVERED ON TIME !

Development Process

- **Environmental Scan Up Front**
  - External Benchmarking
  - Existing Best Practices
- **Collaborative Reviews/Inputs**
  - Software Engineering Institute (CMMI)
  - NDIA
  - AF HSIO
  - LHA Development Team
  - TD 1-12
  - INCOSE
  - Industry Partners

Collaborative build – Included greater SE community

Model Construct



Tool Suite

- **Management Guide**
- **Assessment Tool (Spreadsheet)**
- **Training**
  - **Orientation/Overview**
  - **Self-Assessment**
  - **Validation Team**

Specific Practices Summary

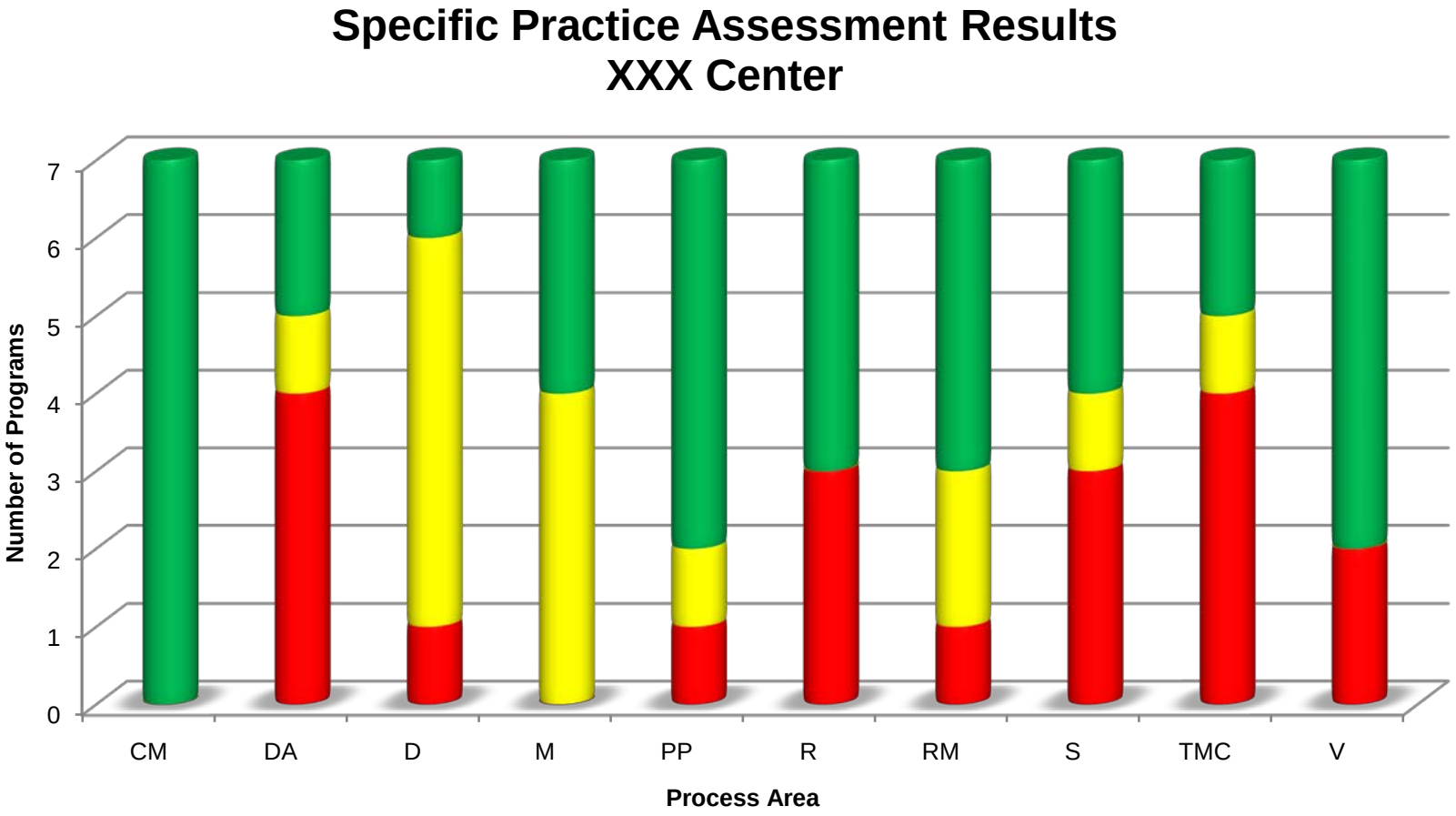
PA LEGEND
90-100%
65-89%
0-64%

SP LEGEND
1
0
Not Applicable

Percentage *(of those practices scored)*	75%	50%	79%	73%	87%	86%	100%	67%	83%	93%
	CM	DA	D	M	PP	R	RM	S	TMC	V
Specific Goal 1										
SP 1.1	1	1	1	0	1	1	1	1	1	1
SP 1.2	1	1	1	1	1	1	1	1	1	1
SP 1.3		0	1	1	1	1	1	1	1	1
SP 1.4		N/A	0		1	1			1	1
SP 1.5		0	0						1	
Specific Goal 2										
SP 2.1	1		1	1	0	1	1	0	1	1
SP 2.2	1		0	1	0	1	1	0	1	1
SP 2.3	0		1		1	1		0	1	
SP 2.4	0		1		1			0		
SP 2.5	N/A				1			0		
SP 2.6					1					
SP 2.7					1					
SP 2.8					1					
Specfic Goal 3										
SP 3.1	1		1	1	1	1	1	1	0	1
SP 3.2	1		1	1	1	0	1	1	0	1
SP 3.3			1	1	1	0			1	0
SP 3.4			1						1	
SP 3.5			1							
Specific Goal 4										
SP 4.1				1		1		1		1
SP 4.2				0		1		1		1
SP 4.3				0		1		1		1
SP 4.4						1		1		1
SP 4.5								1		1
Specific Goal 5										
SP 5.1										N/A
SP 5.2										N/A

Spreadsheet tool provides this output

Scoring Roll-Up



Spiral 2 Considerations

- Capability Enhancement
  - Re-look process areas for improvements
  - Further refine assessment methodology
  - Strengthen inclusion of software
  - Capture and promulgate best practices/lessons learned
  - Review scoring
  - Examine potential use for SE health assessment
  - Migrate to web-based platform
- Charter
  - Establish vision & mission
  - Establish governance
  - Support team by providing resources
  - Signed @ appropriate level
- Funding
  - Spiral 2 & Sustainment
- Lead POC/Steering Group
  - Staff support
  - Community of Interest
  - Configuration control

Implementation By Center

CENTER	5 AUG 08 - FEEDBACK
✓ AAC	"AAC began integrating AF SEAM in our established program assessment process in January 2008 and expects to complete this integration in FY09."
✓ AEDC	"We will begin implementing AF SEAM in October."
✓ ASC	"We are creating a plan to migrate from our current tool to SEAM, tailored with AFMC and ASC specific areas of interest."
✓ ESC	"We have initiated tailoring efforts to implement AF SEAM by the end of the calendar year. We will be working closely with SMC, our acquisition partner, on the tailoring and implementation effort."
✓ OC-ALC	"Strongly support, have plans in place, ready to go!"
✓ OO-ALC	"We are implementing now."
✓ SMC	"SMC plans to adopt AF SEAM and comply with related policies."
✓ WR-ALC	"We'll begin implementation at Robins with pilot assessments in F-15 and Avionics."

Development process yielded 100% buy-in

AFCSE

QUESTIONS ?

Back Up Slides

Agenda

- Background
- Development process
- AF SEAM tool suite:
  - Management guide
  - Assessment tool (Spreadsheet)
  - Training
- Results reporting
- IPT overarching concerns
- Spiral 2 considerations

Defining the Methodology

Low — *Assessment Continuum* — *High*

- **Hands Off**
- **Promulgate Policy**
  - Directives
  - Instructions
  - Checklists
  - Guidance
- **Expect Compliance**

- **AF SEAM**
  - Collaborative & inclusive
  - Leanest possible best practices “Must Dos”
  - Clearly stated expectations
  - Program team & assessor team
  - Training
- **Self-assessment of program with optional validation**

- **Hands On**
- **Comprehensive Continuous Process Improvement**
  - Highly detailed process books
  - Training
- **Independent Assessment**
  - Deep dives

Assessment methods that balance time & effectiveness

Generic Practices Summary

PA/GP	GP1	GP2	GP3	GP4	GP5	GP6	GP7	GP Overall
CM	1	1	1	1	1	1	1	7
DA			1	1	1	1	1	5
D	1	1	1	1	1	1	1	7
M	1	1	1	1	1	1	1	7
PP		1	1		1		1	4
R	1	1	1	1	1	1	1	7
RM	1	1	1	1	1	1		6
S	1	1	1	1	1	1	1	7
TMC		1	1	1	1	1	1	6
V	1	1	1	1	1	1	1	7

[redacted]

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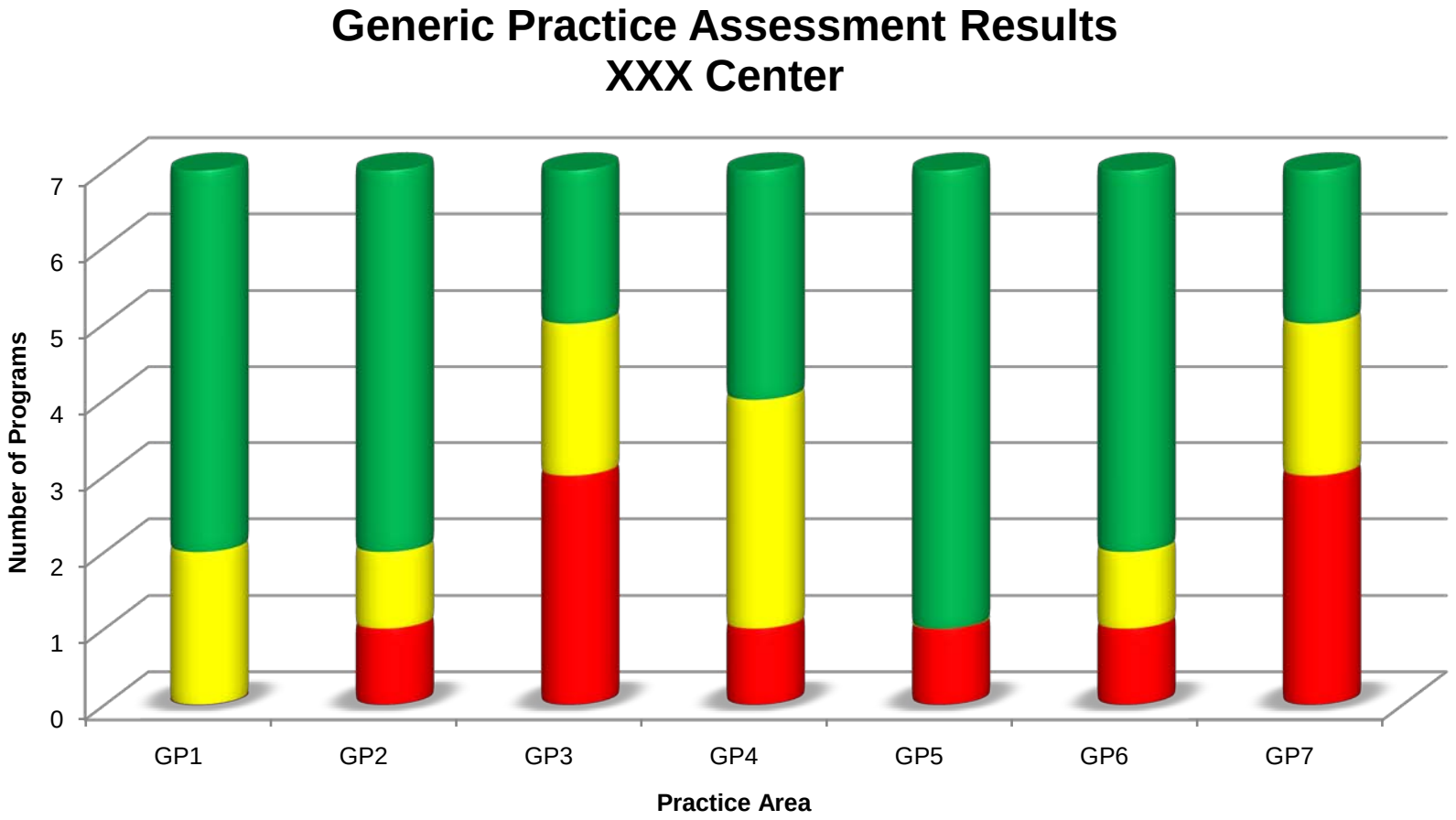
Spreadsheet tool provides this output

Scoring Roll-Up



IPT Overarching Concerns

- **Policy/Guidance**
  - Integrate into AF Instructions, UCI checklists, policy directives, & SEP guidance
  - Required to:
    - Transition from current implementation state to standardized execution AF-wide
    - Achieve AF-level standardization of SE processes
    - Ensure that near-term demands do not override long-term benefits
  - Develop timetable for roll-out
  - Need to preserve AF SEAM as a process improvement tool
    - Culture change required
    - Accurate results rely upon candid program/project team responses (non-attribution)
    - Tiered results reporting delivers accurate & actionable information to each leadership level

- **Interaction of AF SEAM w/ other assessment methodologies & tools**
  - POPS, SMART, CMMI, LHA, etc.

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- ☑ Provide "Brain Drain" insurance
- ☑ Improve AF leadership visibility into SE process maturity

Improved program performance & reduced technical risk

Team Members

Center	Members
AAC	Ian Talbot
AEDC	Neil Peery, Maj Mark Jenks
ASC	Gary Bailey
AF CSE	Randy Bullard, Rich Freeman
HQ AFMC	Caroline Buckey
ESC	Bob Swarz, Bruce Allgood
OC-ALC	Cal Underwood, Bill Raphael
OO-ALC	Jim Belford, Mahnaz Maung
SMC	Linda Taylor
WR-ALC	Jim Jeter, Ronnie Rogers

Process Areas

#	Symbol	Process
1	CM	Configuration Management
2	DA	Decision Analysis
3	D	Design
4	M	Manufacturing
5	PP	Project Planning
6	R	Requirements
7	RM	Risk Management
8	S	Sustainment
9	TMC	Technical Management & Control
10	V	Verification & Validation

Generic Practices

#	Practice Description
GP1	Description of process
GP2	Plans for performing the process
GP3	Adequate resources for performing the process
GP4	Responsibility & authority for performing the process
GP5	Train the people performing the process
GP6	Monitor & control the process
GP7	Review activities, status, & results of the process

Proof of Concept

- Base ESC pilot on ENweb & open source survey engine
- Make tool/code available to all Centers
- Will include:
  - Basic implementation of all rule sets and standards
  - Rudimentary access control of assessment results
  - All presentation formats developed for AF SEAM, downloadable for incorporation into briefings
  - Data entry via a web interface
  - Uploading of supporting artifacts
- Form AF-wide Working Group to discuss larger implementation
- Initiate dialog with 554 ELSW to address/develop courses of action for an acquisition program to develop an AF SEAM toolset

Survey Format Concept

Requirements (R)

The purpose of the Requirements process area is to develop and analyze operational user, product, and product-component requirements, to assure consistency between those require-ments and the project's technical plans and work products and to manage requirements evolu-tion through the life cycle of the product.

*Have comprehensive operational use cases and key test scenarios been developed and coordinated with the end user, acquirer and the operational test agency?

- ○ Yes
- ○ No

*Have comprehensive operational use cases and key test scenarios been developed and coordinated with the end user, acquirer and the operational test agency?

- ○ Yes
- ○ No

*Are requirements clearly and succinctly stated?

- ○ Yes
- ○ No

*Is there a viable closure plan for determining when all technical requirements have been defined and analyzed?

- ○ Yes
- ○ No

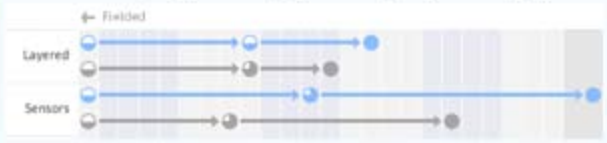
*What process is used to ensure that validated threat information and operational concepts are incorporated into requirements analysis?

(upload document)

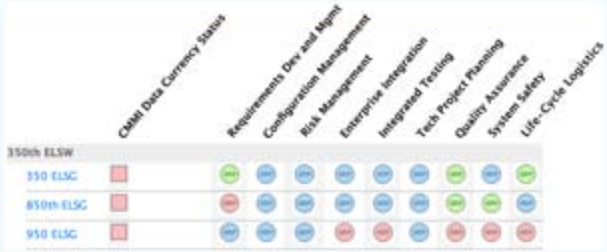
Presentation Concept

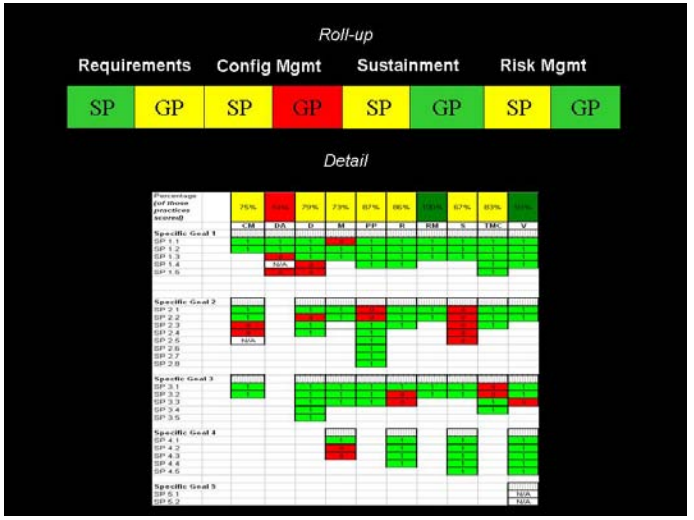
Assessments [edit]

- Watchlists (all CMD level)
  - 350th | 551st | 653rd | 554th | CPSG
- STP: All Wings
  - 350th | 551st | 653rd | 554th | Other



- CMMI: All Wings
  - 350th | 850th | 950th
  - 551st | 651st | 751st | 851st | 951st
  - 554st | 642nd | 653rd | 754th
  - 639th | 640th | KC | KI (none) | KN | KZ
  - 753rd | 853rd | CPSG | Intel (none) | Other





AF SEAM - CMMI-ACQ v1.2

AF SEAM Processes

- Requirements
- Design
- V&V
- Decision Analysis
- Configuration Mgmt
- Risk Mgmt
- Project Planning
- Sustainment
- Manufacturing
- Tech Mgmt & Ctrl
- Generic Practices

CMMI-ACQ Processes v1.2

REQM – Requirements Management (RM)	2
MA – Measurements & Analysis	
PMC – Project Monitoring & Control	
PP – Project Planning	
PPQA – Process and Product Quality Assurance	
SSAD – Solicitation & Supplier Agreement Dev	
CM – Configuration Management	
DAR – Decision Analysis and Resolution	3
AM – Agreement Management	
ARD – Acq Requirements Development	
ATM – Acq Technical Management	
VAL – Acq Validation	
VER – Acq Verification	
OPD – Organizational Process Definition	
OPF – Organizational Process Focus	
IPM – Integrated Project Management (IPPD)	
RSKM – Risk Management	
OT – Organizational Training	
OPP – Organizational Process Performance	4
QPM – Quantitative Project Management	
OID – Organizational Innovation & Deployment	5
CAR – Causal Analysis & Resolution	

CMMI Color Legend: Green = Covered, Yellow = Partially, Red = Not Covered

CMMI Maturity Levels:
1 Initial, 2 Managed, 3 Defined, 4 Quantitatively Managed, 5 Optimizing

AF SEAM - CMMI-DEV v1.2

AF SEAM Processes

- Requirements
- Design
- V&V
- Decision Analysis
- Configuration Mgmt
- Risk Mgmt
- Project Planning
- Sustainment
- Manufacturing
- Tech Mgmt & Ctrl
- Generic Practices

CMMI Color Legend: Green = Covered, Yellow = Partially, Red = Not Covered

CMMI Maturity Levels:
1 Initial, 2 Managed, 3 Defined, 4 Quantitatively Managed, 5 Optimizing

Process Area	*Maturity Level*
Causal Analysis and Resolution	5
Configuration Management	2
Decision Analysis and Resolution	3
Integrated Project Management +IPPD	3
Measurement and Analysis	2
Organizational Innovation and Deployment	5
Organizational Process Definition +IPPD	3
Organizational Process Focus	3
Organizational Process Performance	4
Organizational Training	3
Product Integration	3
Project Monitoring and Control	2
Project Planning	2
Process and Product Quality Assurance	2
Quantitative Project Management	4
Requirements Development	3
Requirements Management	2
Risk Management	3
Supplier Agreement Management	2
Technical Solution	3
Validation	3
Verification	3